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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/578,494

05/05/2006

Yuko Sakata

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1709

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EXAMINER

EOFF, ANCA

ART UNIT

PAPER NUMBER

1753

MAIL DATE

DELIVERY MODE

06/27/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/578,494

Applicant(s)

SAKATA ET AL.

Examiner

Anca Eoff

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 05 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 05/05/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION**Claim Status**

1. Claims 1 - 26 are pending in the application.

Claim Rejections - 35 USC § 102

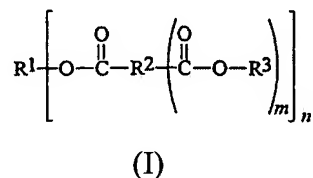
2. The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

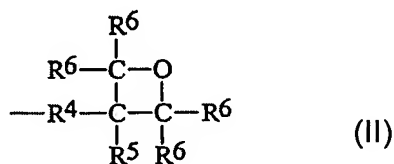
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-2 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Rehnberg et al (WO 02/36660).

With regard to claim 1, Rehnberg et al. disclose a polyester with oxetanyl groups at the molecular ends, such as the compound of formula (I):



(formula (I), page 3), where m is an integer and at least 1, preferably at least 2, n is an integer and at least 2, R₁ is a group derived from a di-, tri- or polyhydric compound, R₂ is alkyl, aryl, alkylaryl and R₃ is an oxetane compound, such as the compound of formula (II):



(formula (II), page 3).

With regard to claims 2 and 5, Rehnberg et al. disclose a preparation method for the polyester with oxetanyl groups, by reacting pentaerythritol, dimethyl terephthalate and 3-ethyl-3-(hydroxymethyl)oxetane (Example 1, page 6)

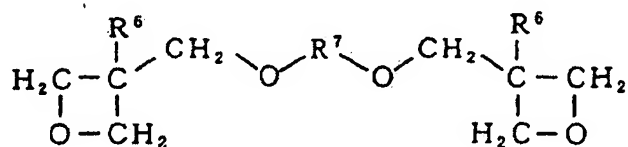
3-ethyl-3-hydroxymethyl oxetane is equivalent to the compound (A) of formula (1) of the instant application, when R₁ is a -CH₂CH₃ group and R₂ is a -CH₂- group.

Dimethyl terephthalate has the formula $(\text{CH}_3\text{-COO})_2\text{C}_6\text{H}_4$ and it is equivalent to the compound (B) of formula (2) in the instant application when R_3 is a divalent $-\text{C}_6\text{H}_4-$ group, R_4 is a $-\text{CH}_3$ group and $n=2$.

Pentaerythritol has the formula $(\text{HO-CH}_2)_4\text{C}$ and it is equivalent to the compound (C) of formula (3) of the instant application, when R_5 is a tetravalent carbon atom, $n=4$.

4. Claims 1, 3-4, 6-21 and 23-26 are rejected under 35 U.S.C. 102(b) as anticipated by Nishikubo et al. (EP 1 276 011).

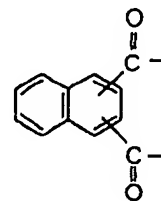
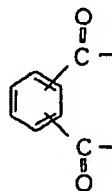
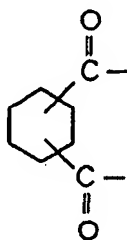
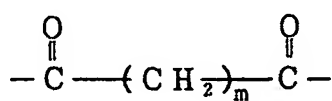
With regard to claims 1 and 3, Nishikubo et al. disclose polyethers with oxetanyl groups at the end of the molecules, such as the compounds of formula (III):



(III)

(par.0044), where R₆ represents a hydrogen atom or an alkyl group with 1 to 6 carbon atoms and R₇ represents a divalent group, such as:

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(formulas (F) – (I) in par.0045), where n is an integer from 1 to 12.

These compounds meet the limitations of claim 3, when R_1 is a hydrogen atom or an alkyl group with 1 to 6 carbon atoms, R_2 is a $-\text{CH}_2-$ group, R_6 is a divalent organic group and $l = 0$.

With regard to claim 4, Nishikubo et al. disclose that the compound having 2 oxetanyl groups/polyester with oxetanyl end groups is a thermosetting compound so, the composition comprising this compound can be advantageously used for the formation of various resinous insulation layer, for the use as etching resist and for the formation of a solder resist on printed circuit boards (par.0043). Using a process of photo and heat curing, the composition produces resist films with improved properties (par.0068).

With regard to claim 6, Nishikubo et al. disclose a composition comprising an oxetane compound having at least two oxetanyl groups in the molecule (abstract). Using a process of photo- and heat-curing, the composition produces resist films with improved properties (par.0068).

In this case, the composition comprising an oxetane compound having at least two oxetanyl groups in the molecule is equivalent to the resist composition comprising the polyester with oxetanyl end groups of the instant application.

With regard to claim 7, Nishikubo et al. disclose that the oxetane compound having at least two oxetanyl group in the molecule/polyester with oxetanyl end groups is incorporated in the composition as a thermosetting component and it is in an approximate content of 20 wt.% based on the total resin component of the composition (see table in par.0095).

With regard to claim 8, Nishikubo et al. disclose that the composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups can also comprise a coloring pigment (par.0061).

With regard to claims 9, 10 and 14, Nishikubo et al. disclose that the composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups forms a pattern, in a process that comprises the following steps:

- adjusting the viscosity of the composition;
- applying the composition to a printed circuit board that has a circuit already formed thereon and pre-drying to evaporate the organic solvent;
- exposing the coated composition to an actinic ray through a mask having a prescribed pattern;
- developing with a dilute aqueous alkaline solution to obtain a resist pattern.
- subjecting the photo-cured film to the heat treatment at a temperature in the approximate range of 140 to 200°C, the heat treatment producing the curing of the thermosetting component (par.0068).

Using the above-mentioned process, a film with improved properties, such as resistance to heat, resistance to solvents, resistance to acids, adhesiveness, electric

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properties (equivalent to an insulation protective layer) was obtained on the printed circuit board used as substrate.

With regard to claims 11 and 12, Nishikubo et al. further disclose that the film produced by photo-curing and heat-curing the composition comprising the compound having 2 oxetanyl groups/ polyester with oxetanyl end groups is improved in various properties, such as resistance to heat, resistance to solvents, resistance to acids, adhesiveness, electric properties (par.0068), said film being equivalent to the insulation protective film of the instant application.

With regard to claims 13 and 15, Nishikubo et al. disclose that the composition comprising the compound having 2 oxetanyl groups/ polyester with oxetanyl end groups can also be used as a material for the interlaminar (interlayer) insulating layer or in a build-up multi-layer printed circuit board, using the method described above for claims 9 and 10 (par.0069).

With regard to claim 16, Nishikubo et al. disclose that that the composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups can be advantageously used as a marking ink (par.0043).

With regard to claim 17, Nishikubo et al. disclose that the oxetane compound having at least two oxetanyl group in the molecule/polyester with oxetanyl end groups is incorporated in the composition as a thermosetting component and it is in an approximate content of 20 wt.% based on the total resin component of the composition (see table in par.0095) and the composition can be used as ink (par.0043)

With regard to claim 18, Nishikubo et al. also disclose that the composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups, can also comprise epoxy compounds as part of the thermosetting component (par.0059) and the composition can be used as ink (par.0043).

With regard to claims 19 and 20, Nishikubo et al. disclose that composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups, comprises a solvent to dissolves the components of the composition (par.0040) and said composition can be used as ink (par.0043).

Nishikubo et al. disclose the use of dipropyleneglycol monomethyl ether (table in par.0095, where dipropyleneglycol monomethyl ether is the only solvent used to dissolve the components of the composition), which has a boiling point of 190°C, as specified in par.0111 of Sano et al. (US Pg-Pub 2003/0236321).

Dipropyleneglycol monomethyl ether is considered a solvent with low vapor pressure, same as diethyleneglycol dibutyl ether (1.3 Pa at 20°C), in accordance to par. 0025 of Yamada et al. (US Pg-Pub 2003/0139063).

It is the examiner's position that the dipropyleneglycol monomethyl ether meets the limitations of claim 20 regarding the properties of the solvent used to dissolve the components of the composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups.

With regard to claims 21, Nishikubo et al. further disclose a dry film produced by photo-curing and heat-curing the composition comprising the compound having 2 oxetanyl groups/ polyester with oxetanyl end groups (par.0099).

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Nishikubo et al. do not give details about the drying and heating the solvent of the composition but it is known in the art that the solvent is removed during process of forming a "dry film" (as shown by Grunwald in par.0031 of US 2003/0003406).

With regard to claims 23-26, Nishikubo et al. disclose that the composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups, following the curing process, can also be used for the interlaminar (interlayer) insulating layer or in a build-up multi-layer printed circuit board (par.0069).

The film produced by photo-curing and heat-curing the composition comprising the compound having 2 oxetanyl groups/polyester with oxetanyl end groups, said film having improved properties, such as resistance to heat, resistance to solvents, resistance to acids, adhesiveness, electric properties (par.0068) is equivalent to the insulation protective layer of the instant application.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van den Berg et al. (US Patent 6,297,329).

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With regard to claim 1, Van den Berg et al. disclose an oxetane-functional polyester (column 19, line 1), equivalent to the polyester having at least one oxetanyl group at the molecular ends, due to the method of preparation (column 19, lines 3-6).

With regard to claims 2 and 5, Van den Berg et al. disclose the preparation of the oxetane-functional polyester from a reaction of diethyl malonate, neopentylene glycol, 3-ethyl-3-hydroxymethyl oxetane in the presence of dibutyl tin oxide and xylene (column 19, lines 3-6).

Diethyl malonate has the formula $\text{CH}_2(\text{COOCH}_2\text{CH}_3)_2$, which is equivalent to the compound (B) having the formula (2) of the instant application, when R_3 is a divalent $-\text{CH}_2-$ group, R_4 is a $-\text{CH}_2\text{CH}_3$ group and $n=4$.

Neopentylene glycol has the formula $(\text{CH}_3)_2\text{C}(\text{CH}_2\text{OH})_2$, which is equivalent to the compound (C) having the formula (3) of the instant application, when R_5 is a divalent organic group $(\text{CH}_3)_2\text{C}(\text{CH}_2-)_2$ and $m=2$.

3-ethyl-3-hydroxymethyl oxetane is equivalent to the compound (A) of formula (1) of the instant application, when R_1 is a $-\text{CH}_2\text{CH}_3$ group and R_2 is a $-\text{CH}_2-$ group.

7. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikubo et al. (EP 1 276 011) in view of Stowe et al. (US Patent 6,454,405).

Nishikubo et al. disclose the polyesters with oxetanyl groups at the end of the molecules of claim 1 and the composition comprising the compound having 2 oxetanyl groups/polyesters with oxetanyl groups that can be used as an ink, as applied to claim 16 above (see paragraph 4 of the Office Action).

Nishikubo et al. also disclose that the composition comprising the compound having 2 oxetanyl groups/polyesters with oxetanyl groups can be applied on substrates using an applicator, a bar coater, a roll coater, a die coater, a curtain flow coater or using a screen printing method (par.0064), it is pre-dried to evaporate the organic solvent, it is exposed to radiation, it is developed to obtain a resist pattern and then it is heat – treated to cure the thermosetting components (par.0068).

However, Nishikubo et al. fail to disclose an ink jet system.

Stowe et al. disclose a method of curing UV curable coatings applied by an ink-jet applicator (column 1, lines 54-55), said ink-jet applicator having the capability of curing the liquid immediately after deposition (column 1, lines 41-44).

Stowe et al. also disclose that UV curing of the ink is the most effective when applied immediately or as soon as practical after the deposition of the ink (column 1, lines 25-27).

Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to use the ink-jet application method of Stowe et al. in the process of Nishikubo et al., in order to maximize the efficiency of curing (Stowe et al., column 1, lines 25-27, 41-44).

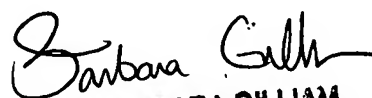
Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AE


BARBARA GILLIAM
PRIMARY EXAMINER